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By-Reynolds, Robert R.
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The purpose of the project was to test, evaluate, revise and expand course materials developed during previous phases of the program. Each unit of work attempted was designed to be included in a full course of study in a vocational education curriculum for junior and senior high school students in Computer Assisted Instruction mode. The 13 vocational teacher participants received formal instruction for 2 hours per week in the use of new coding techniques and entry procedures, utilizing the "batch load" method available through the University of Texas. Participants were also allowed to schedule computer time, in 2-hour blocks as needed. All participants made progress in writing and entering course material, but the process was very time-consuming and required the full-time attention of all concerned, making summer sessions more productive. The program encountered early technical difficulties which hampered the participants in completing their whole objective. The technical difficulties were overcome and computer assisted instruction is definitely a teaching tool of the future, in spite of the frustrations in the development of the program. (MM)

FINAL REPORT

Project No. 7-0175

PA 08

TITLE: "IN SERVICE TRAINING IN COMPUTER ASSISTED INSTRUCTION FOR VOCATIONAL TEACHERS."

AUTHOR: Robert R. Reynolds

INVESTIGATOR: G. C. McGregor, O. P.

GRANT NUMBER: OEG-1-7-070175-2642
Vocational Education Act of 1963,
P. L. 88-210, Sec 4 (c)

GRANT INSTITUTION: Providence College R.I.
Providence, Rhode Island

DATE: December 28, 1966--June 30, 1967

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3 * Office of Education
Bureau of Research
Division of Adult and Vocational Research

SUMMARY OF PROJECT NO. 7-0175

GRANT NUMBER: OEG-1-7-070175-2642

TITLE: "IN SERVICE TRAINING IN COMPUTER ASSISTED INSTRUCTION FOR VOCATIONAL TEACHERS."

INVESTIGATOR: George C. McGregor, OP

INSTITUTION: PROVIDENCE COLLEGE
PROVIDENCE, RHODE ISLAND

DURATION: December 28, 1966--June 30, 1967

PURPOSE: The purpose of this project was to enable the participants to test, revise and evaluate course materials in an attempt to produce one unit of work suitable for student use.

PROCEDURE: Formal instruction in the use of new coding techniques and entry procedures, utilizing the "batch load" method made available through the University of Texas, were conducted. These sessions were held one afternoon a week for two hours. Participants were also allowed to schedule computer time, in two hour blocks, as often as necessary. This time was to be utilized for de-bugging and testing of materials. The entry of new course materials was handled by a technician at the college, utilizing the new card entry technique.

RESULTS AND CONCLUSIONS:

This project was the fourth in a proposed five phase project designed to produce a vocational education curriculum for junior and senior high school students. Due to technical difficulties, explained in our report of Project No. 6-2811, OEG1-7-062811-0016, our objective was changed to one which would attempt to produce one unit of work which would demonstrate the value or lack thereof of a course presented in Computer Assisted Instruction mode.

1. All participants made progress in writing and entering course material.

2. Several participants made significant progress in testing and de-bugging course material.

3. The functions for the use of the slide projector and tape recorder are a valuable asset to CAI.

4. The availability of a technician at the computer center relieved the participant authors of the task of entering new text material, freeing him to test and de-bug his program.

5. The "batch load" method of entry is far superior to entry from the keyboard of the 1050 terminal unit.

6. Expanded functions in the basic software enabled the author to obtain high speed printouts of his course material without tying-up the limited terminal facilities.

7. Representatives of several colleges and universities in the area, as well as several local school department representatives, visited the project.

8. As a result of this project, Providence College has obtained a large body of knowledge in Computer Assisted Instruction and has scheduled a course in the principles of CAI for teachers in their extension division.

9. Fewer technical problems with the hardware enabled the grant participants to concentrate their attention on new course material without fear that this material would be damaged or completely destroyed.

10. Several course sectors seem to show promise of developing into complete semester programs.

It seems apparent that due to the very time-consuming nature of writing course materials, testing and evaluating these materials, and making them available to actual school situations, that a project of this nature requires the full-time attention of all concerned. Progress made during the summer sessions would seem to indicate that these sessions are more productive, in terms of course materials prepared, than the winter-spring sessions.

Although several of the participants were very highly motivated, the problems encountered during the earlier phases of this project have made their mark. It was extremely difficult to foster enthusiasm. Some participants tended to give attention to other activities which offer more immediate satisfaction, rather than to continue in an effort which seemed doomed to frustration and failure--through no basic fault of the participant. Those who did persevere, inspite of the past problems, are very enthusiastic about the potential of Computer Assisted Instruction. Although they were hampered in completing their whole objective, due mainly to equipment failure, they felt that they had made significant progress. It would be indeed unfortunate if their enthusiasm were allowed to terminate.

Computer Assisted Instruction is very definitely the teaching tool of the future. Although there will still be many frustrations in the development of the program, no other tool seems so well suited to meeting the needs of our rapidly expanding and diverse student population.

TABLE OF CONTENTS

STATEMENT OF PURPOSE

The purpose of the project, covering the period from December 28, 1966 to June 30, 1967, was to test, evaluate, revise and expand course materials developed during previous phases of this program. Each unit of work attempted was designed to be included in a full course of study in a vocational education curriculum for junior and senior high school students in Computer Assisted Instruction mode.

GENERAL OBJECTIVES

1. To test and evaluate student records of course materials.

2. To revise course materials as indicated by student response evaluation.

3. To develop proficiency in the coding techniques and entry procedures required in the "batch load" method of inputing course materials.

4. To further develop the proficiency of the participants in the use of the Computer Assisted Instruction System as a proctor, author and student.

5. To develop a greater appreciation of the impact of Computer Assisted Instruction on education.

SPECIFIC OBJECTIVES

1. Each participant was to attend formal classes to gain proficiency in the new techniques of entering materials by means of the "batch load" method.

2. Each participant was to enter as much course material as possible on the disc storage unit.

3. Each participant was to utilize the student response data in the evaluation of his materials.

4. Each participant would arrange to have actual students, or other participants acting as students, take his course material for the purpose of evaluation.

DESCRIPTION OF PROJECT

The project was directed by Rev. George C. McGregor, O.P. and supervised by Mr. Paul Bartolomeo, of Providence College. On April 23, 1967, Rev. McGregor was assigned to other duties by his superiors, and Mr. Bernard Boyd was named to the project as director. The formal instruction in the use of the "batch load" techniques was conducted by Mr. Hans Nef, a technician at the Providence College computer center, and Mr. Robert R. Reynolds, a grant participant. Classes were conducted one afternoon a week for two hours. Use of the new punched card method of entering materials; use of the functions, including KL (key letter), SAVE, SLIDE, PT (play tape), SS (show slide), EDITls and EDITla (editing both the student replies and author anticipated answers); and basic operations of the Computer Assisted Instruction system available at Providence College were covered. In addition to the formal instruction, each participant used computer time for testing and evaluating of course material at his convenience. A technician was provided by the computer center. New course material was encoded by the authors and given to the technician. He would have the material keypunched and entered on the disc unit. The author's course would be up-dated, and a high speed printout of the course material would be obtained.

Mr. Reynolds supervised the preparation and distribution of text materials, conducted the formal class sessions, and was available for consultation to the individual participants upon request.

The problems experienced earlier in this program seemed to be overcome by equipment changes made by IBM personnel, and the new version of Coursewriter made available by the University of Texas. Despite the minor problems still remaining, the morale of the participants seemed to have improved. The three

authors who experienced the most damage to their course material during the previous summer session, spent most of this session re-entering and testing the damaged material.

Each participant was evaluated by the director of the program. Proficiency in the use of the new techniques of entry, use of equipment, quality of written materials, and demonstration of interest as indicated by the independent effort, degree of class and workshop participation, and attitude were considered in determining the final grade of each participant.

STUDENT SELECTION

The thirteen vocational education teachers who participated in this project are the same participants who took part in earlier phases of this grant under U.S. Office of Education contracts OE-5-85-105, OE-6-85-093 and OEG1-7-062811-00116. One new member was admitted by the project director. All members of this group were selected on the basis of their scores on the IBM Programmers Aptitude Test. Names of the participants will be found in Appendix II.

PROJECT EVALUATION

It was very satisfying to realize that the problem that plagued the project, namely equipment failure, has been eliminated to a large extent. The knowledge that course material could be entered with little risk of destruction greatly improved the morale of most of the participants. However, it was extremely difficult to encourage motivation in some of the authors because of the past experience. Before the new method of entry was made available, and the equipment modified to accept this new program, some of the participants had lost the incentive to really commit themselves to the task.

The formal courses were welcomed and proved to be of a great value not only to the participants, but to the instructor as well. The entry of course material by punched cards required an entirely different format than that of the 1050 terminal. The participants adapted to the new format quickly. However, the task of converting previous materials to the new procedure proved almost as time consuming as the preparation of new materials. Yet, the new punched card method enabled most authors to re-enter materials that had been destroyed or damaged during the summer session.

A new feeling of accomplishment and the desire to investigate further the impact of Computer Assisted Instruction on the future of education seemed to be characteristic of this phase of the project. The change in attitude and response of the participants causes us to feel that the objectives of this project have been, or will shortly be met.

We feel that the following results have been achieved:

1. Each participant has entered or is in the process of entering course materials.
2. Most of the participants, whose programs were damaged or destroyed, have reconstructed their materials.

3. A new atmosphere of desire and incentive has been established.

4. The participants have achieved a high degree of proficiency in the new techniques required by the "batch load" method of entry.

5. The participants have made an effort to utilize the computer time made available.

6. The participants have revised course materials as indicated by the student response records.

7. The participants have committed more of their time outside of the formal class program.

CONCLUSIONS

The revised goals seemed to be more realistic. The majority of course sectors cover one to three periods of classroom material. By reducing the amount of material to be covered, the authors were able to test the material, evaluate the student replies, and revise the material accordingly. Although the authors served as the student for each other's course, we believe that the scheduling of high school students anticipated during the summer will serve to demonstrate the effectiveness of instruction presented in Computer Assisted Instruction mode.

Perhaps the most important result of this project was the remarkable change in attitude on the part of the authors. This phase of the program was the most productive phase thus far. We believe that the course material contained in Appendix I demonstrates independent and creative thought, the investment of considerable time and effort on the part of the participants, and usable classroom material. The increased reliability of our equipment, and the new method of course material entry not only served to improve the morale of the authors, but has also increased their productivity as well. We believe that as the results of further experimentation are made available, the time and cost of preparing a usable class lesson will be greatly reduced.

There is absolutely no question in our minds that Computer Assisted Instruction will be the primary teaching tool of the future. By proper utilization of CAI, the teacher will be freed of the drudgery of drill and will be afforded the opportunity to use his or her talents with the students who really need the individual attention--the gifted and the exceptional child. The student is now provided with the opportunity to progress at his or her own rate, under the computer's direction, to explore those avenues of interest that would not and could not be made available to him in the pre-

sent classroom situation, or to appeal to the teacher for specific instruction, direction and guidance. Computer Assisted Instruction actively engages the student for the entire period of time covered in the lesson and should prove to be a positive motivational factor.

RECOMMENDATIONS

1. A users group should be instituted as soon as possible.

2. Newer and more versatile terminal units should be utilized.

3. The project should be expanded to include more participants.

4. Superintendents and other administrative personnel from the local school departments should be encouraged to visit the project.

5. A program for the dissemination of information from projects of an experimental nature similar to this should be instituted under the direction of the U.S. Office of Education.

GUIDELINES FOR FUTURE PROJECTS

1. Refresher courses in the techniques of Coursewriter and the card entry method should be held on a regular basis.

2. Back-up systems should be developed to protect course material that has been entered.

3. The workshop approach should be used, but provision should be made for formal instruction as well.

4. All participants should have the ability to type or typing services should be provided.

5. An independent outside agency should be engaged to evaluate course material. This could be accomplished by cooperation between the project institution and local colleges and universities.

6. Logs of time spent in preparing new material, testing existing material, and evaluation should be kept on a regular basis.

7. Each prospective participant should be fully appraised as to the amount of time that must be devoted to the project before he or she is admitted.

8. A continuous evaluation of the work and interest of each participant should be conducted and not left to the end of the grant period.

9. Each project should actively seek all possible publicity, so as to involve as many groups as possible in the development of Computer Assisted Instruction.

APPENDIX I

SAMPLE COURSE SECTORS

APPENDIX II

PARTICIPANTS AND COURSE TITLES

PARTICIPANTS AND COURSE TITLES

PARTICIPANTS	COURSE TITLES
Robert G. Brooks	Business Law Vocabulary
Joseph DeFusco	Survey in General Insurance
Joseph A. Depasquale	Introduction to Transistors
Edward A. DeSanto	Basic Electric Arc Welding
George J. Grant	Special Factors in Math
Chace E. Loomis, Jr.	Automobile Insurance
Arthur Montanaro	Filing
Amato Nocera	General Mathematics
Ethel O'Connor	Basic Nutrition
Robert R. Reynolds	Introduction to Data Processing
Edward P. Sherlock	Basic Electrical Theory
Allen F. Swann	Basic Data Processing
Raymond Szeflinski	Postal Services
Frank R. Walker, III	English Grammar

APPENDIX III

COMMUNITIES AND SCHOOLS

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HIGH SCHOOLS	COMMUNITIES	STUDENTS
Barrington High School	Barrington, R. I.	1
Central High School	Providence, R. I.	1
Coventry High School	Coventry, R. I.	2
Cranston East High School	Cranston, R. I.	1
Pilgrim High School	Warwick, R. I.	2
Tolman High School	Pawtucket, R. I.	1
Warren High School	Warren, R. I.	1

VOCATIONAL SCHOOLS	COMMUNITIES	STUDENTS
Pawtucket Vocational High School	Pawtucket, R. I.	2
Vocational Tech. School of Rhode Island	Providence, R. I.	3

APPENDIX IV

BASIC COMPUTER ASSISTED INSTRUCTION SYSTEM

BASIC COMPUTER ASSISTED INSTRUCTION SYSTEM

1. Software: Basic IBM Coursewriter Programming Language*

2. Hardware:

QUANTITY	ITEM
1	1401 Central Processing Unit
1	1402 Card Reader-Punch
1	1403 Line Printer
1	1409 Model 2
2	1026 Transmission Control Unit
2**	1050 Data Communications System

* As adapted by the University of Texas to allow batch-loading of punched cards.

** One 1050 Data Communications System has been modified to utilize a slide projector and a tape recorder. This unit serves as the master terminal. The unmodified terminal serves as the "slave".

APPENDIX V

TIME UTILIZATION TABLE

TIME UTILIZATION TABLE

ACTIVITY	HRS. WKLY	PERIOD	TOTAL HRS.
Formal Instruction	2.0	2.0	50.0
Classroom lectures	1.5	1.5	37.5
1050 Techniques	.5	.5	12.5
Testing and De-bugging	4.0	2.0	100.0*
Author Preparation	3.0**	---*	75.0**
	9.0		225.0

* The time spent in testing and de-bugging varied greatly with each author. Two authors spent 6 to 7 hours on week-ends and evenings when the computer time was available. The course material in Appendix I indicates some of this effort.

** This is only an estimate based upon the work of four authors questioned.

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APPENDIX VI

FINANCIAL REPORT